said multicast connections having a fan-out of one or more in said output stage.

53. A network having a plurality of multicast connections, said network comprising:

an input stage comprising r_1 input switches and n_1 inlet links for each of said r_1 input switches, and $N_1 = n_1 * r_1$;

an output stage comprising r_2 output switches and n_2 outlet links for each of said r_2 output switches, and $N_2 = n_2 * r_2$; and

a middle stage comprising m middle switches, and each middle switch comprising at least one link connected to each input switch for a total of at least r_1 first internal links; each middle switch further comprising at least one link connected to each output switch for a total of at least r_2 second internal links, for $x \geq 1$,

wherein each multicast connection from an inlet link passes through at most x middles switches, and said multicast connection further passes to a plurality of outlet links from said at most x middle switches.

54. The network of claim 53, wherein $m \geq x * n_1 + n_2 - 1$, for $x \geq 2$.

55. The network of claim 54,

further is always capable of setting up said connection by never changing path of a previously set up multicast connection, and the network is hereinafter "strictly nonblocking network".

56. The network of claim 53 comprising a controller in communication with said input, output and middle stages to set up said multicast connection.

57. The network of claim 54 wherein said r_1 input switches and r_2 output switches are the same number of switches.

58. The network of claim 54 wherein said n_1 inlet links and n_2 outlet links are the same number of links and $n_1 = n_2 = n$, then $m \geq (x+1) * n - 1$.

59. The strictly nonblocking network of claim 55,

wherein each of said input switches, or each of said output switches, or each of said middle switches further recursively comprise one or more strictly nonblocking networks.

60. The network of claim 53,

wherein each of said input switches, or each of said output switches, or each of said middle switches further recursively comprise one or more networks.

61. A method for setting up one or more multicast connections in a network having an input stage having $n_1 * r_1$ inlet links and r_1 input switches, an output stage having $n_2 * r_2$ outlet links and r_2 output switches, and a middle stage having m middle switches, where each middle switch is connected to each of said r_1 input switches through r_1 first internal links and each middle switch further comprising at least one link connected to at most d said output switches for a total of at least d second internal links, wherein $1 \le d \le r_2$, for $x \ge 2$, said method comprising:

receiving a multicast connection at said input stage;

fanning out said multicast connection in said input stage into at most x middle switches to set up said multicast connection to a plurality of output switches among said r_2 output switches, wherein said plurality of output switches are specified as destinations of said multicast connection, wherein first internal links from said input switch to said at most x middle switches and second internal links to said destinations from said at most x middles switches are available.

62. A method of claim 61 wherein said act of fanning out is performed without changing any existing connection to pass through another middle switch.

63. A method of claim 61 wherein said act of fanning out is performed recursively.

64. A method for setting up one or more multicast connections in a network having an input stage having $n_1 * r_1$ inlet links and r_1 input switches, an output stage having $n_2 * r_2$

outlet links and r_2 output switches, and a middle stage having m middle switches, where each middle switch is connected to each of said r_1 input switches through r_1 first internal links and each of said r_2 said output switches through r_2 second internal links, for $x \geq 2$, said method comprising:

checking if all the destination output switches of said multicast connection have available second internal links from at most x middle switches.

65. The method of claim 64 further comprising:

checking if the input switch of said multicast connection has an available first internal links to said at most x middle switches.

66. The method of claim 64 further comprising:

repeating said checkings of available second internal links to all said destination output switches for all the other combinations of at most x middle switches.

67. The method of claim 64 further comprising:

setting up each of said connection from its said input switch to its said output switches through at most x said middle switches, selected by said checkings, by fanning out said mutlicast connection in its said input switch into at most said x middle stage switches.

68. A method of claim 64 wherein any of said acts of checking and setting up are performed recursively.

69. A method of setting up a multicast connection through a three-stage network, for $x \geq 2$, said method comprising:

fanning out at most x times in an initial stage.

70. The method of claim 69 further comprising:

fanning out any number of times in each of the remaining stages,

wherein said three-stage network includes said remaining stages and said initial stage.